

# **NOZZLE FOR A BLOW MOLDING MACHINE**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

The present invention relates to a nozzle for a blow molding machine, and more particularly to a nozzle for a blow molding machine capable of automatically positioning a semi-finished product in a mold to improve the quality of finished products of a blow molding process.

### **2. Description of Related Art**

With reference to Fig. 6, a conventional nozzle for a blow molding machine in accordance with the prior art comprises a base (70), a bottom collar (72), a head (74) and a top collar (76). The base (70) is connected to a compressed air source (not shown) and has a top (not numbered), a bottom (not numbered), an inlet (702) defined in the bottom and a mouth (704). The mouth (704) is conical, is defined in the top of the base (70) and communicates with the inlet (702). The bottom collar (72) is attached securely to the base (70) with bolts (not numbered) and is mounted around the top of the base (70). The head (74) is attached to the top of the base (70) and has a top (not numbered), a bottom (not numbered) and a central passage (742) defined through the head (74) and communicating with the mouth (704) in the base (70). The top collar (76) is attached securely to the bottom collar (72) with bolts (not numbered) and is mounted around the head (70) to securely hold the head (74) on the base (70).

Blow molding comprises mounting a semi-finished product (80) such as a bottle around the top of the head (74), and the nozzle and the semi-finished product are then moved into an opening (not shown) in a mold (not shown) with

1 a molding chamber (not shown) having a specific shape. Compressed air is  
2 discharged into the central passage (742) through the inlet (702) and the mouth  
3 (704) in the base (70) to expand the semi-finished bottle (80). A finished product  
4 (not numbered) such as a bottle will take the shape of the molding chamber in the  
5 mold, and the blow molding process is complete when the finished product is  
6 removed from the mold.

7 However, the conventional nozzle has a complex structure and is  
8 difficult to assemble and manufacture. The head (74) of the conventional nozzle  
9 is attached securely to the top of the base (70) and is immovable so the position  
10 of the semi-finished product in the mold cannot be adjusted with the  
11 conventional nozzle. When the semi-finished bottle (80) relative to is inclined  
12 relative to the head (74), the shape of the finished bottle will be deformed.

13 To overcome the shortcomings, the present invention provides a nozzle  
14 to mitigate or obviate the aforementioned problems.

## 15 SUMMARY OF THE INVENTION

16 The main objective of the invention is to provide a nozzle for a blow  
17 molding machine that has a simplified structure and is capable of automatically  
18 adjusting the position of semi-finished products in a mold to improve the  
19 manufacturing quality of finished products of a blow molding process.

20 The nozzle for a blow molding machine has a base, an attachment collar  
21 and a head. The base has a top, a bottom, an inlet defined in the bottom and a  
22 mouth defined in the top. The mouth communicates with the inlet and has a first  
23 diameter at the top of the base. The attachment collar is securely attached to the  
24 top of the base and has a top, a bottom and a central hole defined in the bottom of

1 the attachment collar. The head is moveably mounted in the central hole in the  
2 attachment collar. The head has a bottom, a top extending out from the top of the  
3 attachment collar and a central passage with a diameter defined through the head,  
4 communicating with the mouth in the base and having a second diameter at the  
5 bottom of the head. The first diameter of the mouth at the top of the base is larger  
6 than the second diameter of the central passage at the bottom of the head to make  
7 part of the bottom of the head correspond to the mouth. Accordingly, the head  
8 will be pushed upward when compressed air is discharged into the nozzle. The  
9 position of the semi-finished bottle mounted around the top of the head can be  
10 automatically positioned in a mold.

11 Other objects, advantages and novel features of the invention will  
12 become more apparent from the following detailed description when taken in  
13 conjunction with the accompanying drawings.

#### 14 BRIEF DESCRIPTION OF THE DRAWINGS

15 Fig. 1 is a perspective view of a nozzle for a blow molding machine in  
16 accordance with the present invention;

17 Fig. 2 is an exploded perspective view of the nozzle in Fig. 1;

18 Fig. 3 is a cross sectional side plan view of the nozzle in Fig. 1

19 Fig. 4 is an operational side plan view in cross section of a blow mold  
20 with the nozzle in Fig. 1;

21 Fig. 5 is an operational side plan view in cross section of the mold with  
22 the nozzle in Fig. 4 with the head moved upward by compressed air discharged  
23 into the nozzle; and

24 Fig. 6 is an operational side plan view in cross section of a conventional

1 nozzle for a blow molding machine in accordance with the prior art.

## 2 DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

3 With reference to Figs. 1 to 3, a nozzle for a blow molding machine in  
4 accordance with the present invention comprises a base (10), an attachment  
5 collar (20), multiple optional bolts (16), a head (30) and two optional O-rings (40,  
6 42), where the blow molding machine uses an external compressed air source.

7 The base (10) is connected to a compressed air source (not shown) and  
8 has a top (not numbered), a bottom (not numbered), an inlet (11), a mouth (12)  
9 and multiple optional threaded holes (14). The inlet (11) is defined in the bottom.  
10 The mouth (12) may be conical, is defined in the top, communicates with the  
11 inlet (11) and has a first diameter (not numbered) at the top of the base (10). The  
12 optional threaded holes (14) are defined in the top of the base (10).

13 The attachment collar (20) is attached securely to the top of the base (10)  
14 and has a top (not numbered), a bottom (not numbered), a central hole (22), a top  
15 flange (24) and multiple optional through holes (26). The central hole (22) is  
16 defined coaxially through the attachment collar (20), and the (20). The optional  
17 through holes (26) are defined longitudinally through the attachment collar (20)  
18 and align respectively with the optional threaded holes (14) in the base (10).

19 The multiple optional bolts (16) pass respectively through the optional  
20 through holes (26) in the attachment collar (20) and are screwed respectively  
21 into the optional threaded holes (14) in the base (10) to attach the attachment  
22 collar (20) securely to the base (10). Alternatively, the attachment collar (20)  
23 may be attached to the base (10) by rivets, welding or other conventional means.

24 The head (30) is mounted moveably in the central hole (22) in the

1 attachment collar (20) and has a bottom (not numbered), a top (not numbered), a  
2 central passage (32), a bottom protrusion (34) and an optional chamfer (36). The  
3 top of the head (30) extends out the top flange (24) in the attachment collar (20).  
4 The central passage (32) is defined longitudinally through the head (30) and  
5 communicates with the mouth (12) in the base (10). The central passage (32) has  
6 a second diameter at the bottom of the head (30). The first diameter of the mouth  
7 (12) at the top of the base (10) is larger than the second diameter of the central  
8 passage (32) at the bottom of the head (30) to make part of the bottom of the head  
9 (30) correspond to the mouth (12). The bottom protrusion (34) protrudes radially  
10 out from the bottom of the head (30). When the head (30) is mounted in the  
11 attachment collar (30) and the attachment collar (30) is attached to the base (10),  
12 a gap (not numbered) is defined between the top flange (26) of the attachment  
13 collar (20) and the bottom protrusion (34) on the head (30). Consequently, the  
14 head (30) is moveable inside the attachment collar (20). The optional chamfer  
15 (36) is defined around the top of the head (30).

16 One of the optional O-rings (40) is mounted around the protrusion (34)  
17 on the head (30) to prevent compressed air from leaking between the head (30)  
18 and the attachment collar (20). The other optional O-ring (42) is mounted around  
19 the head (30) near the top of the head (30) to prevent compressed air from  
20 leaking between the head (30) and a semi-finished product that is mounted  
21 around the head (30) while blow molding is in process.

22 With reference to Figs. 4 and 5, a blow molding process comprises  
23 mounting a semi-finished product (60) around the top of the head (30) of the  
24 nozzle, and the nozzle is then inserted into an opening in a mold (50) with a

1     molding chamber (52). The top of the head (30) is slightly separated from the  
2     mold (50) to define a gap between the head (30) and the mold (50). Because part  
3     of the bottom of the head (30) corresponds to the mouth (12) in the base (10), the  
4     head (30) will be pushed and move relative to the attachment collar (20) by  
5     compressed air when the compressed air is discharged into the nozzle.  
6     Consequently, the semi-finished product (60) will be squeezed between the head  
7     (30) and the mold (50) during the blow molding process. Squeezing the semi-  
8     finished product (60) will force the semi-finished bottle (60) to move to a desired  
9     position. Accordingly, deformation of the bottle can be prevented, and the  
10    manufacturing quality of final products of the blow molding process is  
11    improved.

12            Even though numerous characteristics and advantages of the present  
13    invention have been set forth in the foregoing description, together with details  
14    of the structure and function of the invention, the disclosure is illustrative only,  
15    and changes may be made in detail, especially in matters of shape, size, and  
16    arrangement of parts within the principles of the invention to the full extent  
17    indicated by the broad general meaning of the terms in which the appended  
18    claims are expressed.